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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,767	11/12/2003	Peter Micah Sandvik	134166	7781
6147	7590	10/18/2005	EXAMINER	
GENERAL ELECTRIC COMPANY GLOBAL RESEARCH PATENT DOCKET RM. BLDG. K1-4A59 NISKAYUNA, NY 12309			CYGAN, MICHAEL T	
			ART UNIT	PAPER NUMBER
			2855	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/706,767

Applicant(s)

SANDVIK ET AL.

Examiner

Michael Cygan

Art Unit

2855

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-12,14-26,29-36 and 38-50 is/are pending in the application.
- 4a) Of the above claim(s) 48-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-12,14-26,29-36 and 38-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

Claims 48-50 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 13 September 2005.

Applicant did not perform an election between the species comprising HFET, MISFET, MESFET, MOSFET, and MISHFET as required by the Office action mailed 23 August 2005. For the purpose of furthering prosecution, that requirement is hereby **withdrawn**. It is noted that only the MISFET embodiment is specifically claimed by itself (claim 48); however, since that claim is withdrawn due to the "passivation layer" species election, no claims are specifically directed towards a single "FET" species.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 38 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 38 lacks antecedent basis since it depends from cancelled claim 37.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 2, 5, 6, 8, 10, 12, 14, 15, 17, and 20-24 are rejected under 35

U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of

Kang (US 5,656,827). Shields teaches a gas sensor device (Figure 7a)

comprising a semiconductive SiC layer [47], catalytic Pt electrode ([52],

column 8 lines 43-52) contacting the SiC surface, chromium ohmic contacts

([26], column 5 lines 54-55) deposited on the SiC surface, where the device is

a MISFET (column 7), where the gate electrode [52] is uncovered by a

passivation layer, where the sensor may sense hydrocarbons (column 8 lines

43-52), where the sensor has a means for heating and is operable in an

environment above 650C (column 9 lines 33-47). Shields does not teach a

passivation layer, although Shields teaches that aluminum nitride and silicon dioxide are good materials for a passivation layer (column 5 lines 29-22).

Kang teaches a gas sensor device (Figures 2, 5, 9) having a semiconductive doped and undoped diamond layer [20,25], catalytic electrode [30] which may be formed of stack consisting of zinc oxide coated with a Pt catalyst (column

8 line 46 through column 9 line 48), and a passivation layer [13] which covers a reference sensor (Figures 5 and 9).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a passivation layer as taught by Kang in the invention taught by Shields to coat a reference sensor formed on the same device as the gas sensor, since Kang teaches that this removes the influence of temperature from interfering with chemical concentration measurements (column 9 line 65 through column 10 line 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use zinc oxide coated with a Pt catalyst as taught by Kang in the invention taught by Shields to form the catalytic gate electrode, since Kang teaches that this enhances specific chemical detection and selectivity (column 8 line 46 through column 9 line 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use doped and undoped diamond layer as taught by Kang in the invention taught by Shields to form the semiconductive layer, since Kang teaches the advantages of desirable properties as enumerated at column 2 lines 29-48.

Shields teaches the claimed invention except for the use of multiple sensors sensing different gases. Kang teaches a FET sensor array having multiple gas selectivities; see column 11 lines 49-59. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use

multiple sensors sensing different gases as taught by Kang in the invention taught by von Shields to form the sensor, since this would allow more discriminate analysis of the sensing fluid.

2. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) as applied to claim 1, further in view of Sibbald (US 4,931,851). Shields teaches the claimed invention except for the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal. Sibbald teaches the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal; see column 3 lines 21-54 and column 4 lines 35-49. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal as taught by Sibbald in the invention taught by Shields, since different metals are taught to have specificity for different analyte gases.
3. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) as applied to claim 1, further in view of Onaga (US 4,816,800). Shields teaches the claimed invention except for the use of lanthanum metal oxide as the catalytically active metal. Onaga teaches the use of  $\text{LaNiO}_3$  as a metal oxide

semiconductor to replace a Pt-Rh gas sensor; see columns 1-2. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use lanthanum metal oxide as the catalytically active metal as taught by Onaga in the invention taught by Shields, since Onaga teaches the advantage of corrosion prevention.

4. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) as applied to claim 1, further in view of Najafi (US 6,140,144). Shields teaches the claimed invention except for the use of a flip-chip design. Najafi teaches a flip-chip design for gas microsensors; see abstract. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a flip-chip design as taught by Najafi in the invention taught by Shields to form the sensor, since Najafi teaches the advantages of controlling the sensor environment.
5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) as applied to claim 1, further in view of Khan (US 6,690,042 B2). Shields teaches the claimed invention except for the use of a heterostructure barrier layer in the MISFET to form a MISHFET. Khan teaches the use of a heterostructure AlGaN layer in a MISFET; see Figure 3. It would have been obvious to one having

ordinary skill in the art at the time the invention was made to use a heterostructure barrier layer to form a MISHFET as taught by Khan in the invention taught by Shields, since Khan teaches the advantage of lower leakage currents as well as improved performance characteristics; see abstract.

6. Claims 18, 25, 26, 29, 30, 32, 34, 36, 38, 40, 41, and 43-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) as applied to claim 1, further in view of von Windheim (US 5,362,975). Shields teaches the claimed invention except for an encapsulation layer. Von Windheim teaches an encapsulation layer for a FET gas sensor; see [17] of Figure 1. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an encapsulation layer as taught by von Windheim in the invention taught by Shields to form the sensor, since von Windheim teaches the advantage of protection of the sensor elements.
7. Claims 31 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) and von Windheim (US 5,362,975) as applied to claim 25, further in view of Sibbald (US 4,931,851). Shields teaches the claimed invention except for the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the



catalytically active metal. Sibbald teaches the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal; see column 3 lines 21-54 and column 4 lines 35-49. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as the catalytically active metal as taught by Sibbald in the invention taught by Shields, since different metals are taught to have specificity for different analyte gases.

8. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) and von Windheim (US 5,362,975) as applied to claim 25, further in view of Onaga (US 4,816,800). Shields teaches the claimed invention except for the use of lanthanum metal oxide as the catalytically active metal. Onaga teaches the use of  $\text{LaNiO}_3$  as a metal oxide semiconductor to replace a Pt-Rh gas sensor; see columns 1-2. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use lanthanum metal oxide as the catalytically active metal as taught by Onaga in the invention taught by Shields, since Onaga teaches the advantage of corrosion prevention.
9. Claims 42 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) and von

Windheim (US 5,362,975) as applied to claim 25, further in view of Najafi (US 6,140,144). Shields teaches the claimed invention except for the use of a flip-chip design. Najafi teaches a flip-chip design for gas microsensors; see abstract. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a flip-chip design as taught by Najafi in the invention taught by Shields to form the sensor, since Najafi teaches the advantages of controlling the sensor environment.

10. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shields (US 5,698,771) in view of Kang (US 5,656,827) and von Windheim (US 5,362,975) as applied to claim 25, further in view of Khan (US 6,690,042 B2). Shields teaches the claimed invention except for the use of a heterostructure barrier layer in the MISFET to form a MISHFET. Khan teaches the use of a heterostructure AlGaIn layer in a MISFET; see Figure 3. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a heterostructure barrier layer to form a MISHFET as taught by Khan in the invention taught by Shields, since Khan teaches the advantage of lower leakage currents as well as improved performance characteristics; see abstract.

***Response to Arguments***

11. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.


***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cygan whose telephone number is (571) 272-2175. The examiner can normally be reached on 8:30-6 M-Th, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
**MICHAEL CYGAN, PH.D.**  
**PRIMARY EXAMINER**